

Technical Recommendations to EPA on the Ecological Risk Assessment for Portland Harbor

Provided by the Eco Team

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Methodology

In August 2005, the EPA/partners Technical Coordinating Team formed a subgroup to develop explicit direction on the Portland Harbor Ecological Risk Assessment (ERA). The team held focused work sessions in September, October and November, and agreed on (1) a management goal and objectives to guide the ERA, (2) a revised ecological conceptual site model, (3) changes to proposed food web structures, (4) changes to the Assessment Endpoint Table, (5) direction on the ERA approach, and (6) high priority data needs to be filled during Round 3 of the Remedial Investigation. The subgroup provides these recommendations to EPA for consideration and transmittal to the Lower Willamette Group as direction for the ERA.

Management Goal and Objectives for the Portland Harbor Superfund Site Ecological Risk Assessment

EPA and partners developed a management goal and management objectives to guide the ERA, as shown below. The goal and objectives explain our reasons for cleaning up the Portland Harbor Superfund Site from an ecological perspective, and they provide justification for doing the ERA. The goal and objectives flow from the Problem Formulation statement in the Portland Harbor Workplan (dated 4/23/04), and provide guidance for the Ecological Conceptual Site Model and Assessment Endpoints. They provide direction and priority for current and future ERA sampling and analysis work.

The management goal and objectives will be used as overall guidance for planning ERA sampling efforts, for justifying studies to fill data gaps, and for providing direction related to the level of acceptable uncertainty in the ERA. They should be incorporated in the rationale or problem formulation sections of all technical memoranda or working documents that relate to Ecological Risk, including the PRE, the Baseline ERA, and the Comprehensive ERA.

Management Goal

Restore, maintain and improve water quality, sediment quality, biological integrity and habitat conditions necessary to support a sustainable, ecologically functional system within the Lower Willamette River, considering current and potential future shoreline and water way use, by reducing or eliminating the potential for exposure to contamination in water, sediments and biota, facilitating restoration activities, and integrating with other regulatory programs.

Management Objectives

1. Reduce contaminant concentrations in riparian soils, sediments, surface water, groundwater, and transition zone water to levels that are protective of the environment and support the restoration and maintenance aquatic and riparian habitats

2. Reduce or eliminate the availability of contaminants to protect semi-aquatic and aquatic plants from deleterious effects.
3. Reduce or eliminate the availability of contaminants to protect benthic and epibenthic species and their food sources from deleterious effects, and achieve target protective levels for bioaccumulative contaminants.
4. Reduce or eliminate the availability of contaminants to protect resident and anadromous fish and their food sources from deleterious effects, maintain a safe fish migration corridor, and achieve target protective levels for bioaccumulative contaminants.
5. Reduce or eliminate the availability of contaminants to protect aquatic-dependent birds and mammals and their food sources from deleterious effects, and achieve target protective levels for bioaccumulative contaminants. .
6. Ensure protection of threatened and endangered species, including candidate species, and species of special status and their habitats from the deleterious effects of contaminants.
7. Ensure protection of species and their habitats that are of cultural significance to Tribes from the deleterious effects of contaminants.

A Revised Ecological Conceptual Site Model

EPA and partners reviewed the preliminary Ecological Conceptual Site Model (CSM) that was proposed by the LWG (see the 9/9/05 Draft Ecological Preliminary Risk Evaluation, Figure 2-1), and made a number of significant changes. The major changes are summarized below, and the revised Ecological CSM is provided in Attachment A.

For the “source side” (the left side) of the CSM, EPA and partners added more detail to better represent the complexity of the physical system. We specified primary, secondary and tertiary sources and release mechanisms; added Air, Riparian Soil, Seeps, and Transition Zone Water under Exposure Medium; and defined Willamette River Surface Water, Willamette River Sediment, and Riparian Soil. We also moved “biota” from Exposure Media to Exposure Route, as captured by the “dietary” component to incorporate trophic transfer. These changes were made to incorporate a wider range of potential contaminant-receptor interactions.

On the “receptor side” (the right side) of the CSM, we added three other plant categories: phytoplankton, periphyton, and terrestrial plants. Phytoplankton and periphyton were added because they will be assessed as potential contaminant pathways in the food web and dietary models, and terrestrial plants were added for completeness in the ecological system (upland responsible parties are responsible for assessing risk to these species). For invertebrates, we added zooplankton and we specified shellfish under macrofauna because these species will be assessed as potential contaminant pathways in the food web and dietary models. For fish, we added adult Chinook salmon and adult Pacific Lamprey because the adults represent distinct, significant receptor-exposure scenarios that were not addressed in the juvenile life stages.

We defined pathway significance determinations in the CSM and changed some of the determinations based on agreement among EPA and partners about the completeness and significance of these pathways.

These changes to the CSM were made to reflect the management goal and objectives and to better guide the food web model, dietary model, and overall approach for the ERA.

Changes to the Food Web Structures

EPA and partners reviewed the preliminary Fish and Wildlife Food Web Models proposed by the LWG (see the 4/23/04 Portland Harbor Workplan, Figures 5-4 and 5-5), and made the following changes. Note: These models are sufficient as general guidance to represent the food web, but they may not provide adequate detail for the Food Web Model and the Dietary Approach.

Changes to the Fish Food Web Model (Figure 5-4)

- Box shading: all boxes should be shaded, except the “Surface water, sediment, and porewater (transition zone)” box, the “Primary producers” box, and the “Zooplankton and drift organisms” box. Add a footnote to the “Primary producers” box and the “Zooplankton and drift organisms” box that states: “These receptors will be assessed as potential pathways for contaminant migration through the food web. They will not be assessed as endpoints themselves.”
- Add an arrow from “Detritivorous fish” to “Omnivorous/herbivorous fish,” to represent sturgeon consuming detritivorous fish.
- Add an arrow from Epibenthic invertebrates to Piscivorous fish to represent bass and pikeminnow eating crayfish.
- Add arrows from “Zooplankton and drift organisms” to both “Infaunal invertebrates” and “Epibenthic Invertebrates.”
- Add a footnote to Epibenthic invertebrates that states “For crayfish, consider scavenging at higher trophic levels.”
- Add a footnote to sculpin in the Invertivorous fish category that states “For sculpin, consider feeding within the same trophic level.”

Changes to the Wildlife Food Web Model (Figure 5-5)

- Add arrows from “Zooplankton and drift organisms” to both “Infaunal invertebrates” and “Epibenthic Invertebrates.”
- Add an arrow from “Reptiles” to “Amphibians.”

In addition, a “real-life” visual, colorful image of the food web is needed as a communication tool for public audiences and interested stakeholders. The visual image should include a cross section of the river in Portland Harbor showing habitat areas, and representatives of the benthic and epibenthic communities, native resident and anadromous fish species, and key wildlife receptors.

Changes to the Assessment Endpoint Table

EPA and partners reviewed the draft Assessment Endpoint Table proposed by the LWG (see the 9/9/05 PRE) and made changes as noted in Attachment B. The right three columns of Attachment B provide information from the LWG's proposed Assessment Endpoint Table, and the left three columns of Attachment B provide changes and comments from EPA and partners, including justification and data needs. The data need numbers listed in the table correlate to the data needs identified in the Data Needs Table.

Approach for the Ecological Risk Assessment

EPA and partners discussed key aspects of the approach for conducting the ERA, including methods the LWG has proposed and additional methods that are needed. Attachment C provides initial direction on the ERA approach. Additional direction for other areas of the approach, including the assessment of risk to lamprey and the assessment of risk to various receptors from groundwater, will be provided by EPA and partners over the coming months.

Data Needs Table

EPA and partners discussed data collected thus far for the ERA, and identified high priority data needs to be filled in Round 3 of the Remedial Investigation. Attachment D provides the Data Needs Table, which includes information on how the additional data will be used and how the data need should be filled.

Over the next few months, EPA and partners will develop direction on the approach for assessing Pacific Lamprey, and additional data needs for Lamprey may accompany that direction. In addition, EPA and partners are evaluating the LWG's proposed Food Web Model and additional data needs for the model may accompany our comments on the proposal.